State of Wisconsin
Department of Natural Resources

Guidelines for Assessing Fish Communities of Wadable Streams in Wisconsin

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Evaluation of the Wisconsin Priority Watershed Program for
Improving Stream Fish Communities

GUIDELINES FOR ASSSESSING FISH COMMUNITIES

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GENERAL SAMPLING PROCEDURES

Mean stream width (MSW) is an important characteristic of each fish community and stream habitat assessment station. The MSW is used to define the length of the station, and the spacing of habitat measurements i.e., distances between transects. The MSW is based on the mean of 10 preliminary measurements of stream width from throughout the station (within approximate station boundaries), including all types of macro-habitats such as runs, riffles, and pools (see: Guidelines for Evaluating Habitat of Wadable Streams in Wisconsin). If the water level appears to be substantially **(greater than 0.15 m**) above normal, sampling should not occur (see: **Station Summary**, in Guidelines for Evaluating Habitat of Wadable Streams in Wisconsin, for determination of water levels). Once the MSW for a station has been determined, this value is used for **all** future sampling, including future years when riparian land use or instream habitat improvements may have changed the actual stream width.

Stations for assessing fish communities in wadable streams are each approximately **35** times the MSW in length. This length is based on the distance necessary to sample more than 3 pool-riffle sequences thereby capturing most fish species present in a wadable stream. If a stream has well-developed pool-riffle structure, then each station should start and end at the base of a riffle to help facilitate fish capture, even if this requires that the distance between the second last and last transect is somewhat more or slightly less than 3 times the MSW in length. Ideally stations should not contain permanent tributaries or hydraulic controls (e.g., dams, old bridge abutments), and should be a sufficient distance away from bridges and other man-made structures that alter the natural stream morphology which may influence the fish and macroinvertebrate community found there. The fish community assessment is done in the exact same stream reach in which stream habitat is evaluated.

Fish community composition and species relative abundance are estimated over the entire length of each station using catch per effort (CPE) sampling procedures. A single electrofishing run is made from the downstream to upstream end of the station. No blocking nets are used. This constitutes the one and only sampling pass. All fish greater than 26 mm in total length are collected. At the end of the pass, all trout, esocids, smallmouth bass, largemouth bass, sauger, and walleye total lengths are measured. The weighing of individual or aggregate gamefish is optional (Table 1). The measuring or weighing of carp, creek chubs, catostomids, bullheads and catfishes, centrarchids, and selected percids (non-darters) is also optional (Table 1). If more than 200 fish of any given gamefish species are captured, a random subsample of 100 are measured. For trout, esocids, smallmouth bass, largemouth bass, sauger, and walleye, if recorded, individual weights may be taken from five fish for each 10 mm length interval.

Fish should be handled carefully to minimize mortality. After processing, the fish are returned to the stream. If fish are being processed before the end of the assessment reach (e.g. fish holding tub is full) fish should be released immediately downstream of a riffle to reduce the chance that fish will be recaptured during the same sampling pass. Small numbers of each species may be preserved as voucher specimens or to check identifications.

DATA COLLECTION

Fish Community Evaluation Four different data sheets are used in the Fish Community Evaluation: **Station Summary, Catch Summary, Individual Fish Data Sheet**, and **Individual Game Fish Data Sheet**. All four data sheets apply to the whole station. There is one **Station Summary** sheet per station and one or more of each of the other data sheets, depending on the number and diversity of fish captured. Guidelines for filling out each data sheet and examples of blank and completed sheets are given on the following pages.

STATION SUMMARY DATA SHEET

This sheet summarizes location, sampling characteristics, and gear used for the entire station. Some of the data on this form are derived from maps or from other data sheets. The location information should be identical to that collected during the Stream Habitat Evaluation for Wadable Streams. The parameters on this sheet are as follows:

Location ----------

Stream Name The name of the stream as shown on the most recent USGS 7.5' topographic map. The name used here should be identical to that used on the other data sheets, and to that used for all other stations on the same stream. Make sure the spelling of the name is accurate and include all parts of the stream name (e.g., "West Branch", "Middle Fork", "River", "Creek", "Brook", "Run", etc.) to avoid confusion. Other commonly used names for the stream can be written here in parentheses.

Waterbody ID Code A unique seven-digit number that identifies each stream; all streams, rivers, and lakes in Wisconsin should have an assigned number. These numbers are available on the DNR intranet, under the listing for "DNR Tabular Database Service" for the WDNR Register of Waterbodies (ROW). As with Stream Name, waterbody ID code should be the same for all stations on a stream.

Site Mile The distance along the stream channel from the mouth of the stream to the downstream end of the station. This distance is a useful shorthand for indicating and identifying the location of the station. Site mile should be measured on the most recent USGS 7.5' topographic map to the nearest 0.1 mile using a map wheel.

Station Number If a stream has two or more stations, the downstream station is number 1, the next upstream is number 2, and so on. If there is only one station, the number is 1.

Date Fill in the date when the fish community data were collected for the station, use the YYYYMMDD format (e.g., 19900607 equals June 7, 1990).

Starting Location A precise narrative description of the point on the stream where the fish sampling began (i.e., the downstream end of the station). The description should include the exact distance and direction from the start to a "permanent" landmark such as a bridge, building, road marker, rock formation, etc. **Avoid using landmarks that might be lost during future years** (e.g., don't use tree or fence lines). Make the description as specific and precise as possible so that someone visiting the station for the first time can easily find the starting point.

Township, Range, Section, 1/4 - 1/4 Section, 1/4 Section Legal description for the Starting Location of the station within the Public Lands System. These can be determined from recent USGS 7.5' topographic maps or a detailed county map. On a topographic map, a "land locator" template is useful for determining the 1/4 - 1/4 and 1/4 Sections, which are indicated by a compass direction (NW, NE, SW, or SE). Note that in Wisconsin, all Townships are "N" (north), but Range can be either "E" or "W" (east or west). Make sure the appropriate letter is included for both Township and Range.

Latitude and Longitude It is important that geographic coordinates of the **start** of the station are recorded, along with the Method Used to determine latitude and longitude (e.g. USGS map, mapping software, global positioning system (GPS) units). Also the geodetic Datum Used upon which the coordinates of the map, mapping software or GPS coordinates are based (e.g. North American Datum 1983 (NAD 83), should also be recorded.

7.5' Quad Map Name The name of the most recent USGS 7.5' topographic map on which the station is found.

Basin Name The name of the Basin in which the station is found, following WDNR designations (e.g., Lower Grant, Middle Trempealeau, Upper Wisconsin, etc.).

Watershed Name The name of the watershed in which the stream is located.

County The name of the county in which the station is located.

Sampling Description ----------

Sampling Type The type of fish sampling done at the station. Check the appropriate category. Generally, during Baseline Monitoring Assessments, single pass catch per effort (CPE) sampling is done. In special cases, other types of sampling, such as "Depletion" or "Mark-Recapture" may also be done at a station.

Station Length The length of the stream assessment station. Measure with a tape measure to the nearest 1 m following the middle of the stream channel.

Number of Passes The total number of times a shocker is passed through the station during fish sampling. Normally, for "CPE" sampling there will be only one upstream pass, and for "Depletion" sampling there will be four or more passes. During depletion sampling, an upstream and then downstream run is usually regarded as "1" pass, but the fish captured are processed separately (see Type of Pass below).

Time The time range during which the electrofishing was conducted. "Start" refers to the time when the first electrofishing pass was started, and "Finish" refers to the time when the last pass was completed. Use the "military" format (i.e., 9:30 AM is 0930 hrs. and 9:30 PM is 2130 hrs.), to the nearest 10 minutes.

Type of Pass A description of the sampling direction through the station during a pass. "Upstream Only" refers to a pass that begins at the downstream end of the station, proceeds upstream, and then ends at the upstream end of the station. This is the type of pass used for "CPE" sampling. "Upstream, then Downstream" refers to a pass that begins at the downstream end of the station, proceeds upstream to the upstream end of the station, and then proceeds back downstream to the downstream end of the station. This is the type of pass used in "Depletion" sampling, and constitutes "1" pass; a minimum of 4 passes are completed for depletion sampling.

Gear Description ----------

Gear A description of the number and type of electrofishing units used in sampling. Specify the number of each type of gear that applies. Sampling will normally involve one or two backpack shockers or one stream shocker.

Number of Anodes per Unit The number of anodes per shocker. Normally there is one for backpacks and two or three (three preferred) for stream shockers.

Blocknets Record the number and mesh size of any blocknets used. For "CPE" sampling, no blocknets are used. For "Depletion" sampling, use a single downstream and a single upstream blocknet.

For Backpacks and Stream Shockers:

Anode Size The length of the long axis of the anode (the diamond-shaped or circular stainless steel tip on the hand-held probe), measured with a tape measure to the nearest 1.0 mm. If multiple anodes are used on a shocker, they must all have the same Anode Size, Shape, and Material Thickness. Anode Size can be changed (by replacing the tip with a larger tip, or covering part of the tip with electrical tape) if necessary to maintain a relatively constant voltage and amperage.

Anode Material Thickness The thickness (diameter) of the metal used to form the tip of the anode. Measure with calipers or a ruler to the nearest 0.1 mm.

Anode Shape The general shape of the metal tip of the anode.

For Mini-Boom Shockers:

Anode Length The length of the exposed metal portion of the cylindrical dropper(s) that come off the boom and dangles into the water. Measure with a tape measure to the nearest 0.01 m.

Anode Diameter The outside diameter of the exposed metal portion of the droppers on the front boom. Measure with calipers or a ruler to the nearest 1.0 mm.

Number of Front Droppers The number of individual droppers on the front boom.

Meter Readings ----------

Type of Electroshocker Current The type of electrical current (AC, DC, or pulsed DC) that the shocker puts into the water (this will often be different from that put out by the generator in the shocker). Check the appropriate category.

Electroshocker Control Box Meter Readings The typical output readings (i.e., not the extreme high or low readings) observed during sampling. Note the units of amperage and voltage for the meters when recording the meter values. Efforts should be made to keep readings fairly constant during shocking within a station, between stations within a stream; and if possible, among samples of the same station over time. Preliminary sampling just downstream of the station may be necessary to determine the output readings associated with the most effective electrofishing. As a rule of thumb, try to keep voltage above 150 V and **average** amperage above 2 A. Voltage can be adjusted by changing the number and surface area of anodes (see above), and amperage can be adjusted by increasing generator output (adjusting generator throttle, using a boost switch if present, or using a generator with a different power rating). For AC or pulsed DC, some control box output ammeters read peak rather average amperage; if this is the case, this should be noted on the sheet. Peak amperage equals four times the average amperage. If output meters are not present or are broken, note this on the sheet. Always try to use shockers with functioning output meters.

If Pulsed DC This refers to two important parameters, "Pulse Rate" and "Duty Cycle", of pulsed DC current. Some shockers allow values for these parameters to be varied, whereas others have a single fixed value for each parameter. If values can be varied, they should be set to the appropriate level at the beginning of sampling and not changed during sampling. This may require preliminary sampling just outside the station to determine the values where shocking is most effective. The same values should be used for all sampling within a station, between stations within a stream, and among samples of the same station over time. Sampling for many species is most effective and least harmful at Pulse Rates of 40-80 per second and at Duty Cycles of 10-20%.

Person(s) Who Collected Fish Data The **full** names of the person(s) who actually identified and measured the fish collected during the fish community evaluation.

COMMENTS / NOTES Any and all information that seems to be relevant to the fish community survey but is not recorded anywhere else on the data sheets. This information should include weather, water, and habitat conditions (e.g., glare, wind, precipitation, water clarity, unusually deep or shallow areas) and gear performance (e.g., problems with generators or meters) that influenced sampling effectiveness. Any evidence of fish kills (i.e., dead fish in the water or on the bank) or angler use of the stream (e.g., hooks and lines caught in bushes; evidence of cleaned fish on the bank; footprints from waders) should also be noted. Don't hesitate to make comments; **if in doubt, write it down**.

CATCH SUMMARY DATA SHEET

This data sheet is for summarizing and recording the numbers and aggregate weights, by species, of fish captured during each sampling pass. There should be a separate Catch Summary data sheet for each upstream and each downstream run. In other words, if an upstream and then downstream run are completed, the runs should be kept separate; fill out a data sheet for the upstream run, and then fill out an additional data sheet for the downstream run. Thus, depending on the number passes and species captured; there may be more than one of these data sheets for each station. The parameters on this sheet are as follows:

Stream Same as for **Station Summary** data sheet.

Waterbody ID Code Same as for **Station Summary** data sheet.

Site Mile Same as for **Station Summary** data sheet.

Station No Same as for **Station Summary** data sheet.

Date Same as for **Station Summary** data sheet.

Pass Number The pass that this data sheet refers to. The first pass through a Station is "1", the second pass is "2", the third pass is "3", and so on. For Baseline CPE sampling, only one pass is used. For depletion sampling, 4 or more passes should be used.

Time The starting and ending time of actual electrofishing for the pass should be recorded here. If the shocking run is interrupted (e.g., to work up fish when the fish holding tub is full, or due to equipment failure, etc.) the time of the interruption should be noted as the End time; the time actual shocking was resumed and finally ended should be recorded in the parentheses. Elapsed shocking time (in minutes) should be recorded after Total.

Pass Direction Record the direction of the pass (either upstream or downstream) used to capture the fish recorded on this data sheet. There should be a separate **Catch Summary** data sheet for each upstream and downstream run. In other words, if an upstream and downstream run are completed, the runs should be kept separate; fill out a data sheet for the upstream run, and then fill out an additional data sheet for the downstream run.

Catch Summary **----------**

This section of the data sheet is used to summarize the identity, total number, total weight, number of fish with deformities, eroded fins, lesions, and tumors (DELT), number of handling mortalities, the number of voucher specimens retained, and the number of marked or recaptured fish for each species captured. For species that are individually measured (Table 1), transcribe these totals from the **Individual Fish** and **Individual Game Fish Data Sheets**.

Species The identity of each species captured during the pass. Only accepted American Fisheries Society common names should be used (see Robins et al. 1991. Common and scientific names of fishes from the United States and Canada. AFS Special Publication No. 20). If any abbreviations are used, they should be used consistently and explained somewhere on this data sheet. If an exact species identity is unknown, identify fish to lowest possible taxon (i.e., to genus or family), and preserve all the specimens of that species for later complete identification.

Number Caught The total number of a species captured during the pass.

Weight (Optional) The total wet weight (g) of all fish of a species captured during the pass. Weigh to the nearest 0.1 g or to the nearest 1 % of total weight, whichever is larger. For example, for a species with an aggregate weight of about 8 g, weigh to the nearest 0.1 g; for a species with an aggregate weight of about 60 g, weigh to the nearest 1 g; for a species with an aggregate weight of about 250 g, weigh to the nearest 3 g; for a species with an aggregate weight of about 1450 g, weigh to the nearest 15 g; and so on. Weigh groups of fish in a net or plastic bag using an appropriately sized Pesola® spring balance (Gross weight), **and don't forget to subtract the weight of the net or bag** (Tare weight) to get the actual weight of the fish (FINAL weight).

Number DELT The total number of fish of a species that have Deformities, Eroded fins or scales, Lesions, or Tumors ("DELT"). Only obvious deformities, eroded fins or scales, lesions, and tumors observed on live fish should be counted. Electrofishing sometimes causes wounds or burns; do not count these as DELT.

Handling Mortalities The total number of fish of a species killed as a result of the sampling. Every effort should be made to reduce the number of fish killed, but some mortality is inevitable. Only fish that are definitely dead should be counted.

Number of Vouchers The total number of fish of a species that were retained as vouchers or to check identification. All fish that cannot be identified to species with certainty should be preserved in 10% formalin. As many as 25 fish per species may be preserved one time at each station to serve as vouchers and checks on identifications.

Number Marked The number of fish of a species marked or tagged and released alive (for mark and recapture population estimates or for movement studies) during the pass.

Number Recaptured The number of fish of a species from the pass which possess a mark or tag from a previous sampling event.

Lab Check (Vouchers) When voucher specimens are preserved, verify the Number of Vouchers retained and record a check in the "Number" column. If the number preserved (after a lab count) does not match the Number Vouchers, then record the correct number under Number Vouchers. Verify the identification of vouchers and record a check in the "ID" column. If the field identification (under Species) was incorrect, based on a lab examination, change Species to the correct identification.

INDIVIDUAL GAME FISH AND INDIVIDUAL FISH DATA SHEETS

The **Individual Game Fish** and **Individual Fish** data sheets are used to record total lengths, weights, and other information for individual fish captured during a pass. Thus, depending on the number of fish captured and the number of passes made, there may be from one to more than four of these data sheets for each station. Only fish for which total lengths are to be measured need to be recorded on these sheets (Table 1). Juvenile and adult trout, esocids, smallmouth bass, largemouth bass, sauger, and walleye should be measured individually and the data recorded on the **Individual Game Fish** data sheet. The recording of the individual or aggregate weights of individual adult or young of the year (YOY) gamefish listed above is optional. The recording of the weights of carp, creek chubs, catostomids, bullheads and catfishes, rock bass, sunfish, crappies, and yellow perch is also optional and can be weighed in aggregate (Table 1). If more that 200 of any species listed above are captured, a random subsample of 100 fish can be measured. All other species not listed above should be counted. The total number, aggregate weight, and number DELT, number of handling mortalities, number of vouchers, number marked, and number recaptured of each species should be transcribed to the **Catch Summary** data sheet. The parameters on this sheet are as follows:

Stream Same as for **Station Summary** data sheet.

Waterbody ID Code Same as for **Station Summary** data sheet.

Site Mile Same as for **Station Summary** data sheet.

Station No Same as for **Station Summary** data sheet.

Date Same as for **Station Summary** data sheet.

Pass Number Same as for **Catch Summary** data sheet.

Species The identity of each species captured and measured during the pass. To make data summary and computer data entry easier, try to record only one species per **Individual Fish** data sheet. Follow guidelines from the **Catch Summary** data sheet for recording species identities.

Total Length The distance from the tip of the snout to the posterior tip of the longest caudal (tail) lobe of each individual fish. The caudal lobes should be pinched together slightly when measuring this distance. Measure, to the nearest 0.001 m, using a meter stick or measuring board.

Weight (Optional) The wet weight of each individual fish. Weigh to the nearest 0.1 g or 1 % of body weight, whichever is larger (see explanation under Aggregate Weight for the **Catch Summary** data sheet) with an appropriately-sized Pesola® spring balance. Weights should only be taken for up to five fish from each 10 mm total length interval, and then only for the following species: trout, esocids, smallmouth and largemouth bass, sauger, and walleye (Table 1) and recorded on the **Individual Game Fish** data sheet.

Scales (Optional) An indication (Yes or No) of whether a fish had scales removed and saved. Scales are removed to aid in aging fish. If age information is being collected, at least 6 scales should be removed from a spot on the right side of the fish, several scale rows above the lateral line at a position just posterior to the tip of the pectoral fin when that fin is laid flat along the body. For each species of fish, always take scales from approximately the same location. Scales should only be taken from up to 10 fish per 10 mm total length class, and then only for trout, esocids, smallmouth and largemouth bass, sauger and walleye (see "Weight" above). The tally sheet can be used to keep track of the number of fish for each size class that have had scales removed. Scales need not be taken from fish less than 80 mm total length. Scales should be saved in scale envelopes (available from most WDNR offices) that have accurate location, date, species identity, length, weight, and capture information recorded on them.

DELT A brief description of the location and types of Deformities, Eroded fins or scales, Lesions, or Tumors ("DELT") observed on a fish. Only obvious DELTs observed on live fish should be recorded. Electrofishing sometimes causes wounds or burns; do not count these as DELTs. If no DELTs were apparent, leave this space blank.

Table 1: Species or groups of species that should be measured individually in total length (mm). Individual weights are optional and should be recorded for five fish from each 10 mm total length interval. Collection of scales is optional and may be taken from five fish for each 10 mm total length interval. All other species not listed should be counted.

INDIVIDUAL SPECIES ***Total counts only***	***INDIVIDUAL SPECIES LENGTHS***
Cyprinids Carp (Cyprinus carpio) Creek chub (Semotilus atromaculatus) **Catostomids** Carpsuckers (Carpiodes spp.) Longnose sucker (Catostomus catostomus) White sucker (Catostomus commersoni) Blue sucker (Cycleptus elongatus) Chubsukers (Erimyzon spp.) N. hog sucker (Hypentelium nigricans) Buffalos (Ictiobus spp.) Spotted sucker (Minytrema melanops) Redhorses (Moxostoma spp.) **Ictalurids** Bullheads (Ameiurus spp.) Channel catfish (Ictalurus punctatus) Flathead catfish (Pylodictis olivaris) **Centrarchids** Rock bass (Ambloplites rupesteris) Sunfish (Lepomis spp.) Crappies(Pomoxis spp.) **Percids** Yellow perch (Perca flavescens)	**Trout** Rainbow trout (Onchorhynchus mykiss) Brown trout (Salmo trutta) Brook trout (Salvelinus fontinalis) **Esocids** Grass pickeral (Esox americanus) Northern pike (Esox lucius) Muskellunge (Esox masquinongy) **Centrarchids** Smallmouth bass (Micropterus dolomieu) Largemouth bass (Micropterus salmoides) **Percids** Sauger (Stizostedion canadense) Walleye (Stizostedion vitreum)